

CLAIMS

1. Production method of at least one expanded core monomode optical fibre, characterised in that it comprises the following successive steps:

- assembly of at least one graded index multimode fibre with at least one mode expansion monomode fibre, such that said graded index multimode fibre retains the diameter of the optical beam propagated therein;
- splitting of said graded index multimode fibre to form a protective component of predetermined length of said mode expansion monomode fibre.

2. Production method according to claim 1, characterised in that said mode expansion monomode fibre comprises a monomode fibre, at least one segment of silica fibre, and at least a second segment of graded index multimode fibre.

3. Production method of at least one expanded core monomode optical fibre, characterised in that it comprises the following successive steps:

- a first assembly step of a first graded index fibre with a first silica fibre;
- a first splitting step of said first silica fibre, so as to obtain a first segment of silica fibre of predetermined length;
- a second assembly step of a second graded index fibre at the free end of said first segment of silica fibre;
- a second splitting step of said second graded index fibre, so as to obtain a segment of graded index

fibre of predetermined length, referred to as the second segment of graded index fibre;

- a third assembly step of a second silica fibre at the free end of said second segment of graded index  
5 fibre;

- a third splitting step of said second silica fibre, so as to obtain a second segment of silica fibre of predetermined length;

- a fourth assembly step of a monomode fibre at  
10 the free end of said second segment of silica fibre, so as to obtain an expanded core monomode optical fibre.

4. Production method according to claim 3, characterised in that it also comprises a splitting step of said first graded index fibre, so as to obtain  
15 a first segment of graded index fibre.

5. Production method according to claim 4, characterised in that said first and second segments of graded index fibre are of the same type.

6. Production method according to claim 4,  
20 characterised in that said first and second segments of graded index fibre are of different types.

7. Production method according to any of claims 1 to 6, characterised in that it uses ribbons of  $n$  fibres, so as to produce a set of  $n$  expanded core monomode  
25 optical fibres collectively.

8. Production method according to any of claims 1 to 7, characterised in that it comprises a geometric modelling step of the free end of said first segment of graded index fibre.

30 9. Production method according to claim 8, characterised in that said geometric modelling step

consists of straight cleaving and/or straight polishing of said end.

10. Production method according to claim 8, characterised in that said geometric modelling step  
5 consists of cleaving at an angle and/or polishing at an angle of said end.

11. Production method according to claim 8, characterised in that said geometric modelling step is used to round said end, so as to form a lens.

12. Production method according to claim 11, characterised in that said end is rounded using any of the techniques belonging to the group comprising:

- melting;
- drawing;
- 15 - material addition.

13. Production method according to claim 8, characterised in that said geometric modelling step consists of etching said end using any of the techniques belonging to the group comprising:

- 20 - chemical etching;
- mechanical etching by polishing;
- laser etching.

14. Optical monomode fibre collimator, characterised in that it comprises at least one segment  
25 of mode expansion fibre, and at least one segment of expansion holding fibre comprising at least a first segment of graded index multimode fibre.

15. Optical collimator according to claim 14, characterised in that said segments of mode expansion  
30 and expansion holding fibre have the same diameter as said monomode fibre.

16. Optical collimator according to any of claims 14 and 15, characterised in that said segment of mode expansion fibre comprises at least one segment of silica fibre and at least a second segment of graded index multimode fibre.

17. Optical collimator according to claim 16, characterised in that said segment of mode expansion fibre consists of two segments of silica fibre, between which said second segment of graded index multimode fibre is inserted.

18. Optical collimator according to any of claims 14 to 17, characterised in that one end of said first segment of graded index multimode fibre is cleaved and/or polished straight.

19. Optical collimator according to any of claims 14 to 17, characterised in that one end of said first segment of graded index multimode fibre is cleaved and/or polished at an angle.

20. Optical collimator according to any of claims 14 to 17, characterised in that one end of said first segment of graded index multimode fibre is rounded.

21. Optical collimator according to claim 20, characterised in that said end is rounded using any of the techniques belonging to the group comprising:

- melting;
- drawing;
- material addition.

22. Optical collimator according to any of claims 14 to 17, characterised in that one end of said first segment of graded index multimode fibre is

modelled using any of the techniques belonging to the group comprising:

- chemical etching;
- mechanical etching by polishing;
- 5       - laser etching.

23. Expanded mode diameter monomode optical fibre, characterised in that it comprises at its end at least one mode expansion section and at least one expansion holding section comprising at least a first segment of  
10       graded index multimode fibre forming a protective component of predetermined length of said mode expansion section, said expansion holding section retaining the diameter of the optical beam propagated therein.

15       24. Monomode optical fibre according to claim 23, characterised in that said mode expansion section comprises at least one segment of silica fibre and at least a second segment of graded index multimode fibre.

25       25. Monomode optical fibre according to claim 24, characterised in that said mode expansion section comprises two segments of silica fibre between which  
20       said second segment of graded index multimode fibre is inserted.

26. Monomode optical fibre according to any of  
25       claims 23 to 25, characterised in that said monomode fibre, said mode expansion section and said expansion holding section have the same diameter.

27. Monomode optical fibre according to any of  
30       claims 23 to 26, characterised in that said monomode fibre is of the polarisation holding type.